

# Reindeer of St. Matthew Island

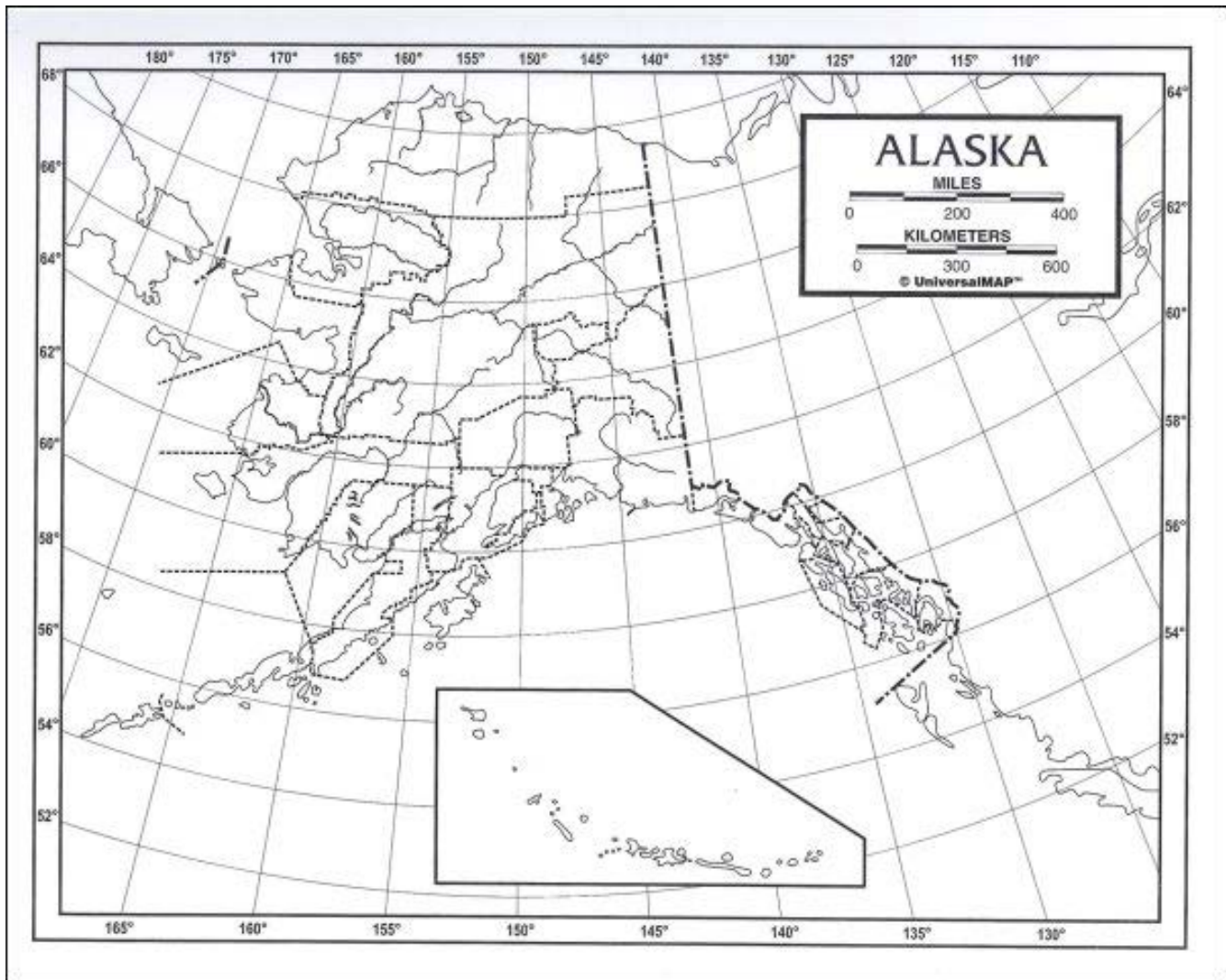
## Introduction

Every ecosystem has a carrying capacity for each of the organisms in it. **Carrying capacity** is defined as the number of individuals within a species that the ecosystem can support over the long-term. When a population grows so quickly that it exceeds the carrying capacity, an **overshoot** occurs. This can be disastrous, as a lack of resources will lead to wide-spread death due to starvation or disease. The resulting drop in population is called a **dieback**. This activity will show you one famous example of a population that overshoot its carrying capacity.

## The Story

In August of 1944, the United States coast guard captured and transported 29 reindeer from Nunivak Island and floated them 200 miles north on a barge to St. Matthew Island. This island is one of the most remote places in Alaska. The Coast Guard had a small manned station here, and the reindeer herd was intended to be a food source. The only potential predator for the reindeer on this island was Arctic fox, which are too small to kill anything but newly born reindeer calves.

Locate St. Matthew Island (60.4°N, 172.7°W) and Nunivak Island (60.4°N, 166.1°W) on this map. Draw an arrow to show the movement of the reindeer on the barge.



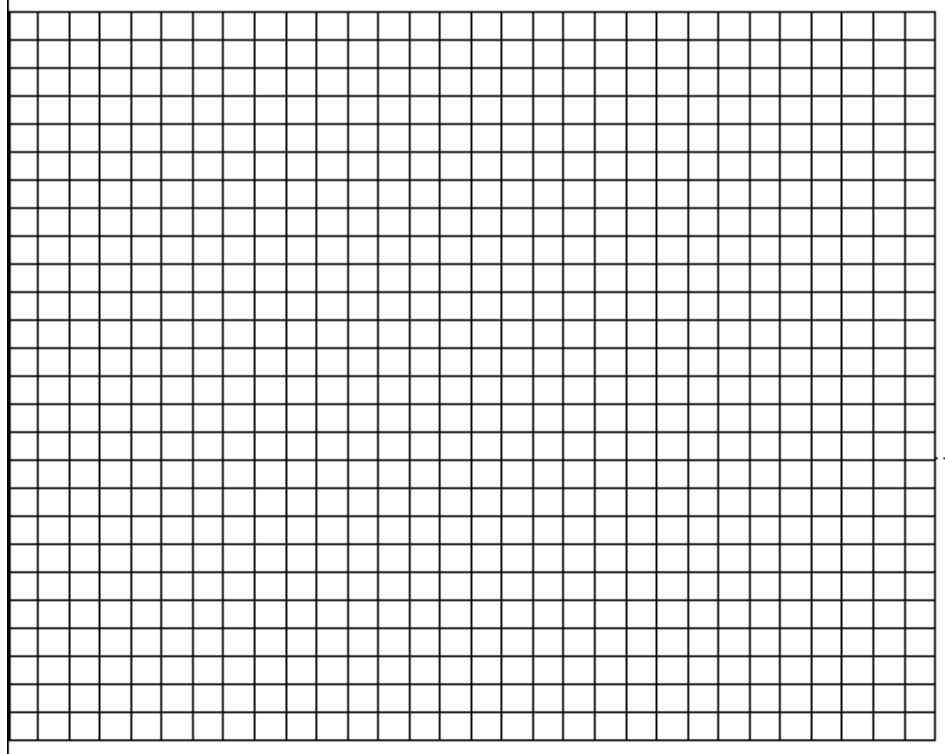
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The reindeer primarily used lichen as a food source. Lichen is a combination of a fungus and algae that live in a mutualistic relationship. Lichen grow very slowly in Arctic regions such as this. World War II ended soon after the reindeer were introduced, so none of them were ever actually hunted by the Coast Guard officers. The island was abandoned by humans, and the deer were left without any predators. In these conditions, their population thrived.

A biologist working for the U.S. Fish and Wildlife Service began making regular visits to the island. In 1957 he counted 1,350 reindeer. He also noted that many of the lichen patches appeared trampled and barren.

Graph the reindeer population from 1944-1963.

Year	Population of Reindeer
1944	29
1945	37
1946	54
1947	81
1948	104
1949	139
1950	177
1951	240
1952	313
1953	398
1954	501
1955	630
1956	878
1957	1,350
1958	1,918
1959	2,840
1960	3,688
1961	4,040
1962	4,933
1963	6,000



The biologist noted the population continued to rise, but the health of the herd seemed to be decreasing. Finally, when he returned to the island again in 1966, he observed only 42 remaining reindeer. The island was covered with thousands of skeletons. Add this data to the graph above.

Of the 42 remaining reindeer, only one was male. The male was observed to have irregularly shaped antlers, and probably had some sort of genetic defect. By 1967, the reindeer were completely absent from the island. Add this data to the graph above.

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## Analysis

1. Why did the deer initially show exponential growth?
2. What caused the population to decline when it had once been healthy?
3. Based on the graph above, what do you think the carrying capacity of this island was for reindeer? Explain how you came to this answer.
4. Why is it bad to for a population to **overshoot** the carrying capacity of an ecosystem?
5. If the Coast Guard were to try this again on a similar island, what changes could they make to prevent the same outcome?